

Name

Class



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Circle theorems

(9 – 1) Topic booklet

Higher

These questions have been collated from previous years GCSE Mathematics papers.

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**
- If the question is a **1H** question you are not allowed to use a calculator.
- If the question is a **2H** or a **3H** question, you may use a calculator to help you answer.

Information

- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

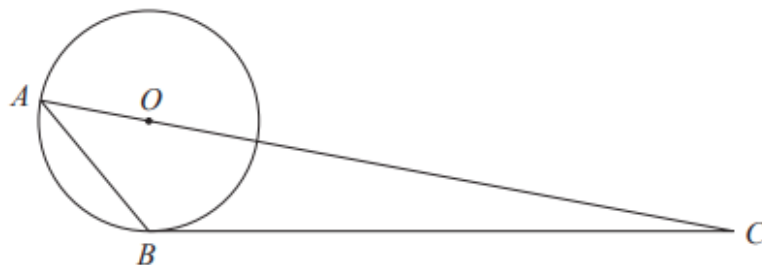
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions

Write your answers in the space provided.

You must write down all the stages in your working.

11



A and B are points on a circle, centre O .

BC is a tangent to the circle.

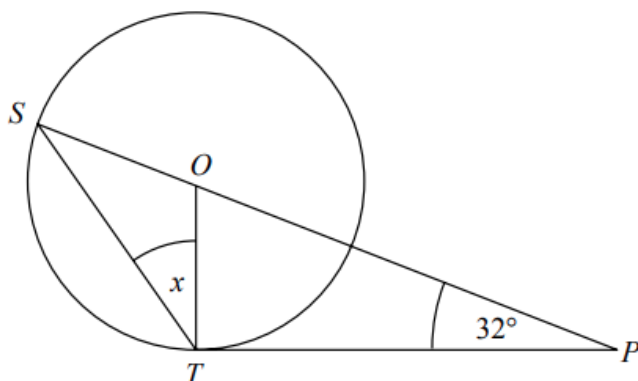
AOC is a straight line.

Angle $ABO = x^\circ$.

Find the size of angle ACB , in terms of x .

Give your answer in its simplest form.

Give reasons for each stage of your working.



S and T are points on the circumference of a circle, centre O .

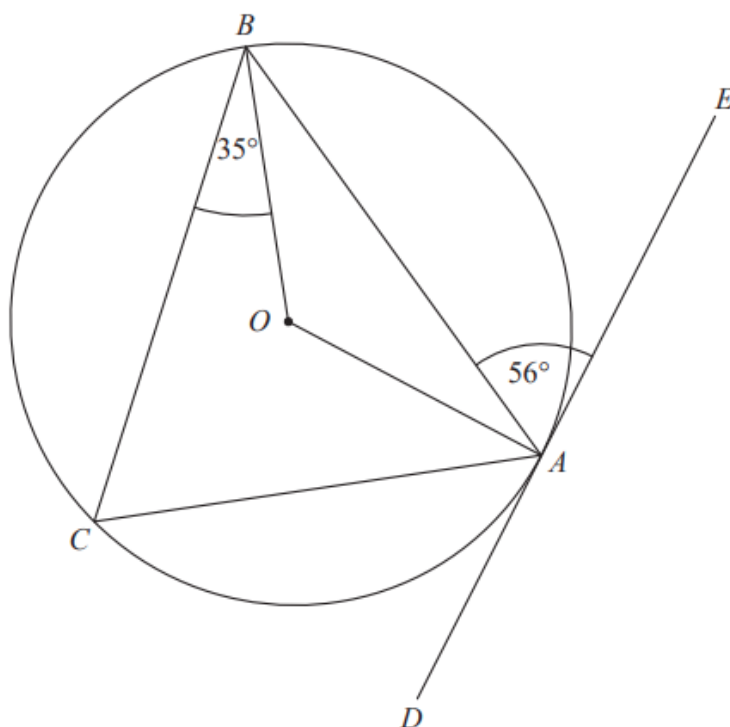
PT is a tangent to the circle.

SOP is a straight line.

Angle $OPT = 32^\circ$

Work out the size of the angle marked x .

You must give a reason for each stage of your working.

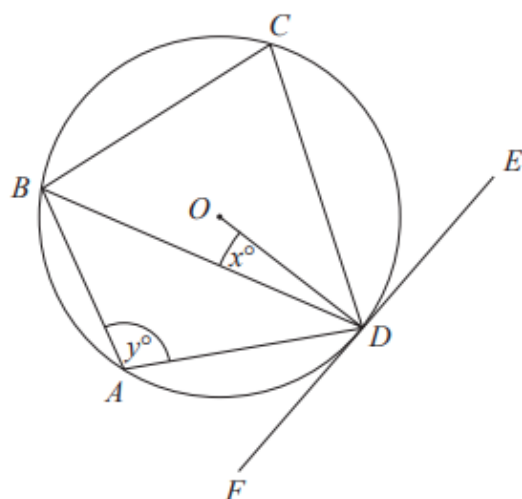


A , B and C are points on the circumference of a circle, centre O .
 DAE is the tangent to the circle at A .

Angle $BAE = 56^\circ$

Angle $CBO = 35^\circ$

Work out the size of angle CAO .
 You must show all your working.



A , B , C and D are points on the circumference of a circle, centre O .
 FDE is a tangent to the circle.

- (a) Show that $y - x = 90$

You must give a reason for each stage of your working.

(3)

Dylan was asked to give some possible values for x and y .

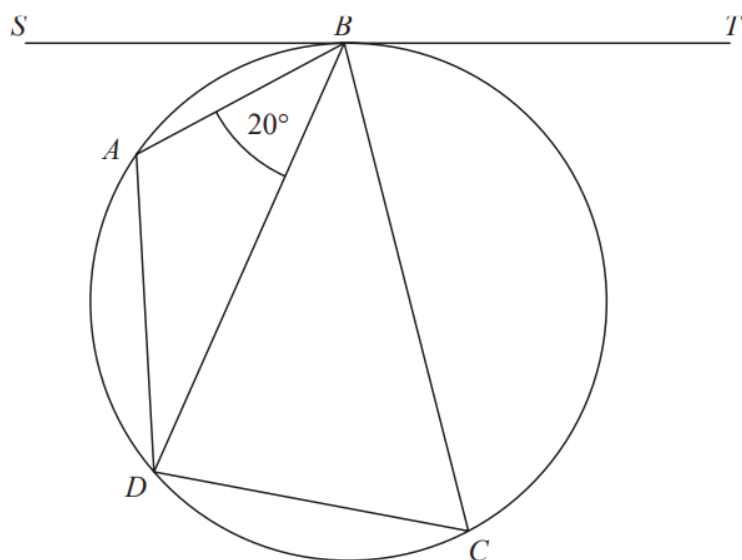
He said,

“ y could be 200 and x could be 110, because $200 - 110 = 90$ ”

- (b) Is Dylan correct?

You must give a reason for your answer.

(1)



A , B , C and D are four points on a circle.

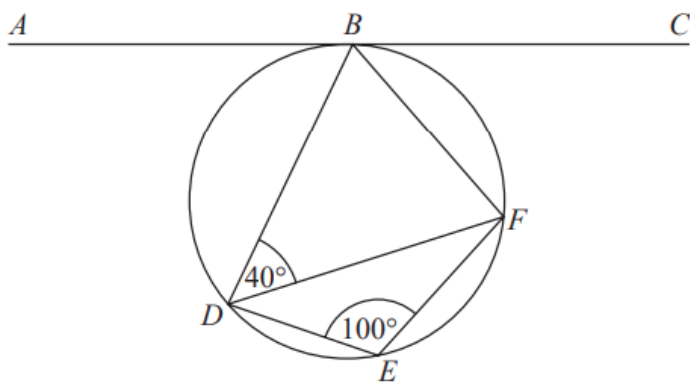
SBT is a tangent to the circle.

Angle $ABD = 20^\circ$

the size of angle BAD : the size of angle $BCD = 3 : 1$

Find the size of angle SBA .

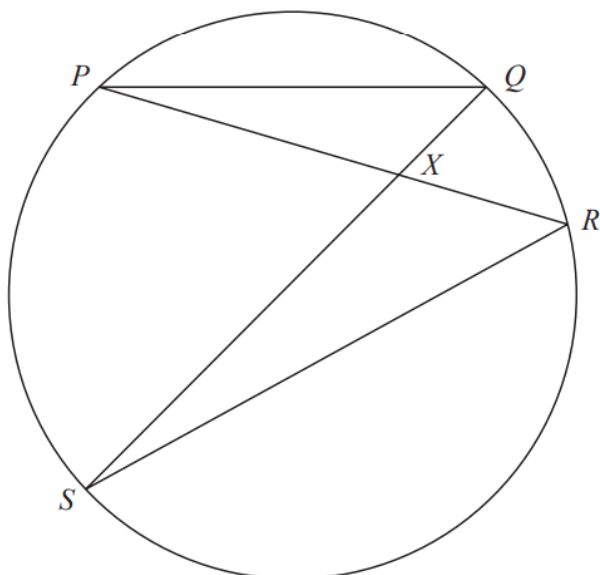
Give a reason for each stage of your working.



Points B , D , E and F lie on a circle.
 ABC is the tangent to the circle at B .

Find the size of angle ABD .
You must give a reason for each stage of your working.

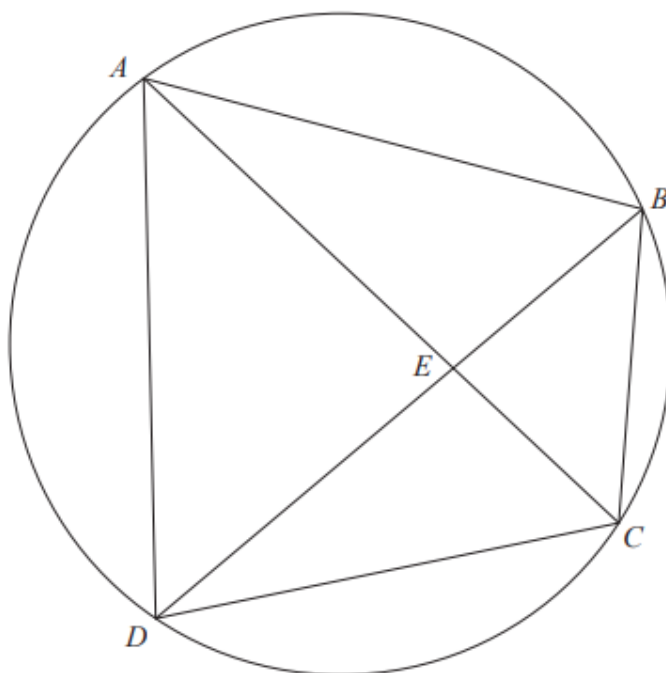
15 P , Q , R and S are four points on a circle.



PXR and SXQ are straight lines.

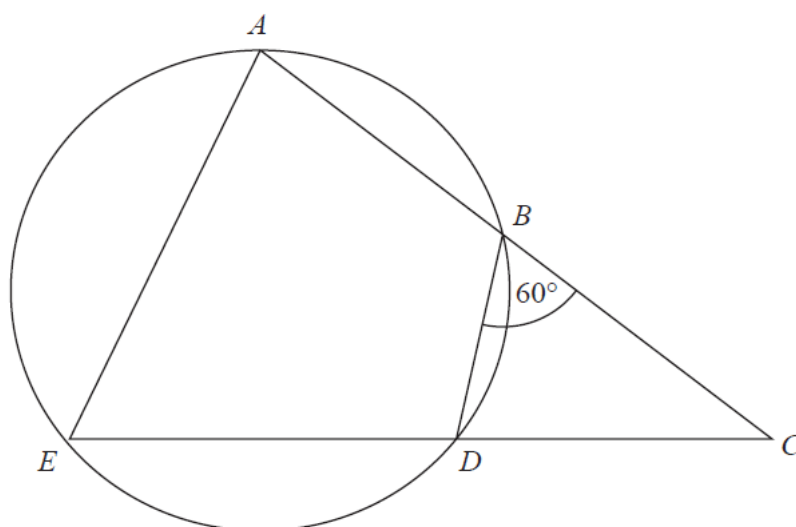
Prove that triangle PQX and triangle SRX are similar.

15 A, B, C and D are four points on the circumference of a circle.



AEC and BED are straight lines.

Prove that triangle ABE and triangle DCE are similar.
You must give reasons for each stage of your working.



$ABDE$ is a cyclic quadrilateral.

ABC and EDC are straight lines.

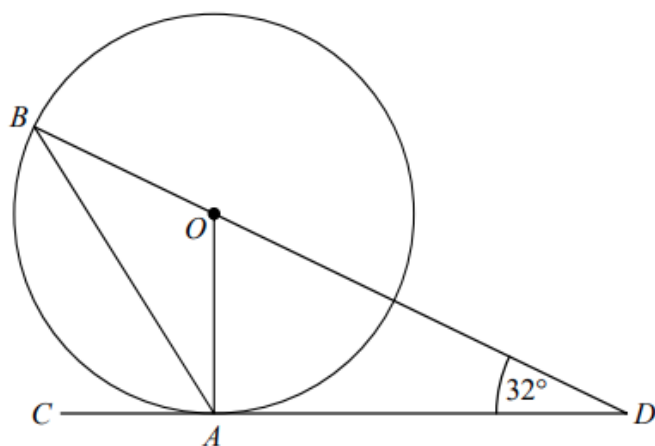
Angle $DBC = 60^\circ$

Given that

size of angle EAB : size of angle $BCD = 2 : 1$

work out the size of angle BCD .

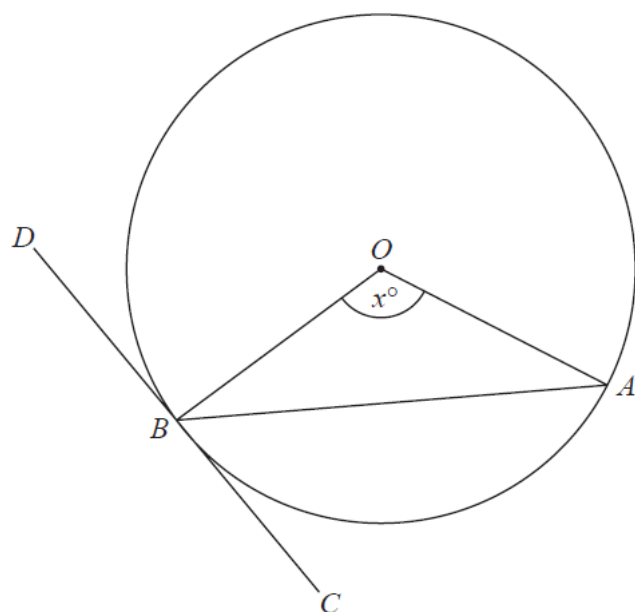
You must show all your working.



*A and B are points on a circle with centre O.
CAD is the tangent to the circle at A.
BOD is a straight line.*

Angle $ODA = 32^\circ$

*Work out the size of angle CAB.
You must show all your working.*



A and *B* are points on a circle, centre *O*.

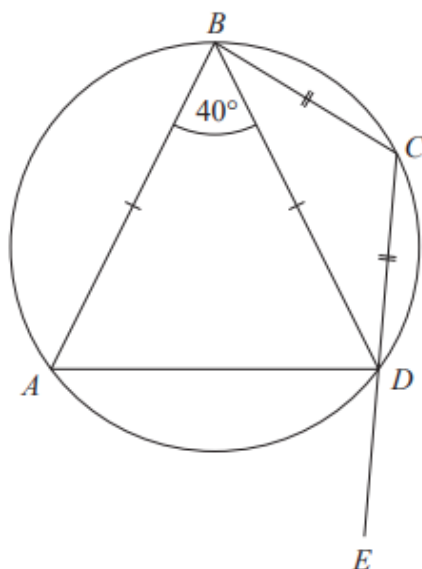
DBC is the tangent to the circle at *B*.

Angle $AOB = x^\circ$

Show that angle $ABC = \frac{1}{2}x^\circ$

You must give a reason for each stage of your working.

- 18** The points A , B , C and D lie on a circle.
 CDE is a straight line.



$$BA = BD$$

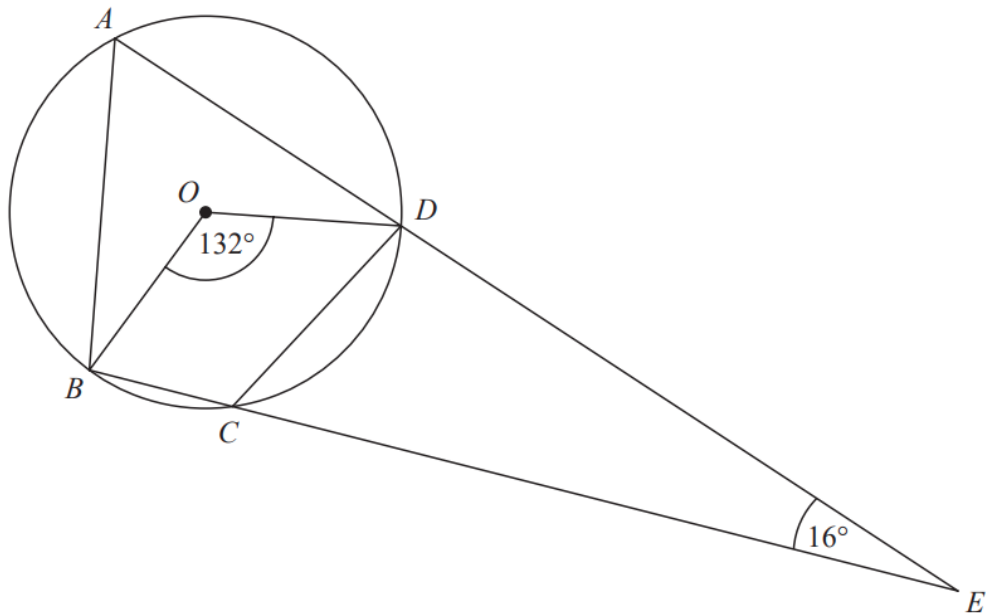
$$CB = CD$$

$$\text{Angle } ABD = 40^\circ$$

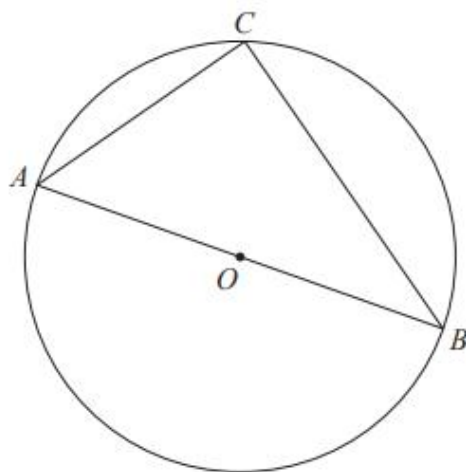
Work out the size of angle ADE .

You must give a reason for each stage of your working.

20 A, B, C and D are points on the circumference of a circle, centre O .
 ADE and BCE are straight lines.



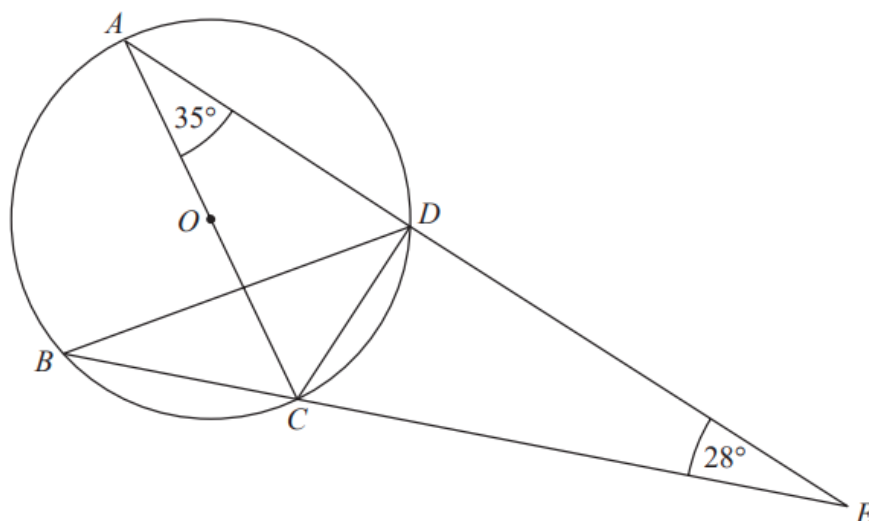
Work out the size of angle CDE .
 Give a reason for each stage of your working.



A , B and C are points on the circumference of a circle, centre O .
 AOB is a diameter of the circle.

Prove that angle ACB is 90°

You must **not** use any circle theorems in your proof.



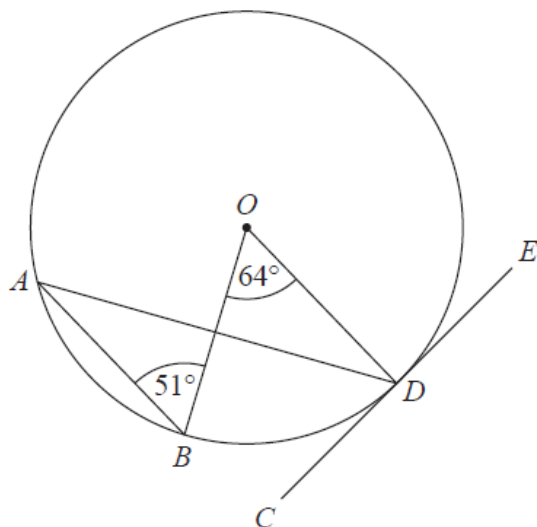
A , B , C and D are points on the circumference of a circle, centre O .
 AC is a diameter of the circle.

ADE and BCE are straight lines.

Work out the size of angle BDC .

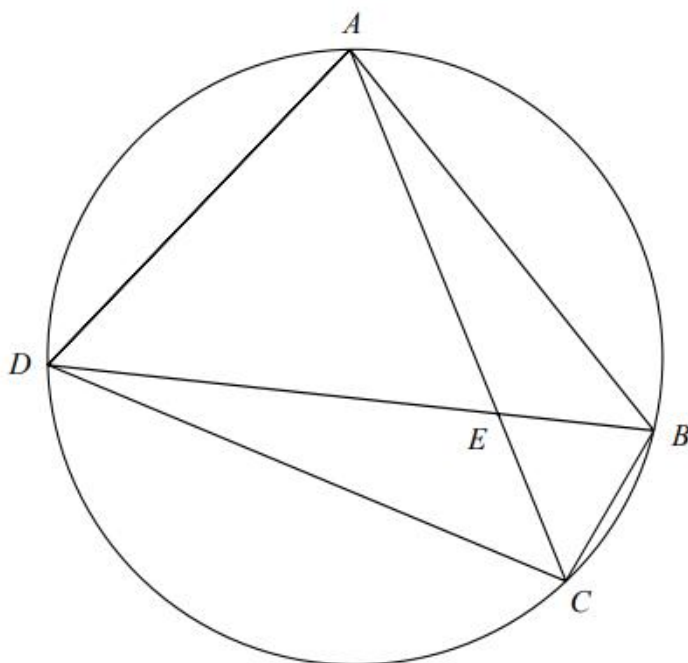
Write down any circle theorems that you use.

- 21 A , B and D are points on a circle with centre O .
 CDE is the tangent to the circle at D .



Work out the size of angle ADC .
 Write down any circle theorems you use.

22 A, B, C and D are four points on a circle.

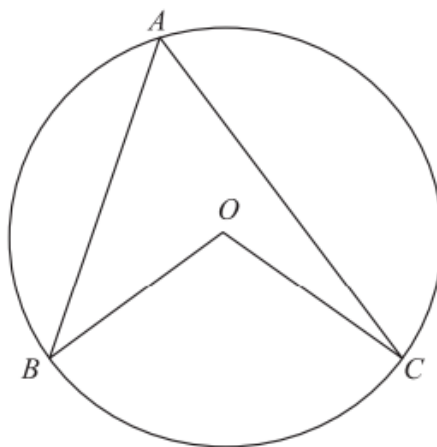


AEC and DEB are straight lines.

Triangle AED is an equilateral triangle.

Prove that triangle ABC is congruent to triangle DCB .

24 A , B and C are points on the circumference of a circle centre O .



Prove that angle BOC is twice the size of angle BAC .